

REMARKS

Applicants thank the Examiner for his thorough search of the art and Office Action. Applicants, by this Amendment, have amended the claims to overcome deficiencies noted in the Examiner's Official Action. After entry of this Amendment Claims 2, 6 – 9 and 12 - 16 remain pending in the Application.

In the Official Action, the Examiner objected to the disclosure because of numerous informalities. The informalities were recited in detail.

Each of the informalities pointed out by the Examiner in the Office Action has been corrected substantially as suggested by the Examiner.

The Examiner inquired whether “PLZT” is the correct acronym for lead lanthanum zirconium titanate.

Applicants confirm that the acronym (PLZT) about which the Examiner inquired is a correct acronym for the substance (lead lanthanum zirconium titanate) with which it is associated in the Specification.

Continuing in the Office Action, the Examiner objected to the drawings, specifically objecting to a spelling error noted in FIGs. 5 and 6.

Applicants have submitted herewith a replacement drawing sheet for FIGs. 5 and 6 with the spelling error corrected.

The Examiner continued in the Office Action, rejecting Claims 13 – 14 under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. According to the Examiner, the claims contain subject matter which was not described in the Specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The Examiner stated that the Specification fails to describe what combinations would be encompassed by the group consisting of “combinations thereof”. Accordingly, the Examiner stated, one skilled in the art would not have been able to ascertain which ones of the multitudes of “combinations thereof” would have been encompassed within the scope of such a limitation. Therefore, the Examiner asserted, one skilled in the art would not have been enabled to make (i.e., the full scope of combinations) and use the invention intended by Applicants without resorting to undue experimentation.

Applicants respectfully traverse the Examiner's rejection of Claims 13 – 14 under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. As presently presented in the Application Claims 13 – 14 do not use the phrase “combinations thereof”. The composite material of the invention is now clearly claimed as comprising at least one substance selected from a list of substances. The Specification clearly supports this language as the Specification clearly names at least one such substance.

Applicants respectfully request that the Examiner remove his rejection of Claims 13 – 14 under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement.

The Examiner continued in the Office Action, rejecting Claims 8, 9, 13 and 14 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention.

With regard to Claims 8, 9 and 12 (sic), the Examiner stated that it is unclear how a gap as recited in these claims relates to the gap as recited in independent claim 1 from which these claims ultimately depend. [Applicants are confused because the Examiner did not list Claim 12 in the initial recitation of the rejection under 35 U.S.C. 112, second paragraph, and the Examiner objected to Claim 12 elsewhere in the Office Action.]

Applicants respectfully traverse the Examiner's rejection of Claims 8, 9 and 12 under 35 U.S.C. 112, second paragraph, as being indefinite. [Solely in the interest of facilitating prosecution of the present Application, Applicants will argue regarding patentability of Claim 12 in connection with this rejection even though it is not clear that the Examiner has rejected Claim 12 under 35 U.S.C. 112, second paragraph.] Claims 8, 9 and 12 have been amended to clearly recite how Claims 8, 9 and 12 relate to the gap set forth in their respective parent claims.

Applicants respectfully request that the Examiner remove his rejection of Claims 8, 9 and 12 under 35 U.S.C. 112, second paragraph, as being indefinite.

With regard to Claims 13 and 14, the Examiner stated that in view of the lack of adequate written description as to what constitutes "combinations thereof", one of ordinary skill in the art cannot determine (i.e., even in light of the Specification) the proper scope of coverage intended by the limitation "combinations thereof".

Applicants respectfully traverse the Examiner's rejection of Claims 13 and 14 under 35 U.S.C. 112, second paragraph, as being indefinite. As discussed earlier hereinabove in connection with the Examiner's rejection of Claims 13 – 14 under 35 U.S.C. 112, first paragraph, Claims 13 – 14 (as amended) do not use the phrase "combinations thereof". The composite material of the

invention is now clearly claimed as comprising at least one substance selected from a list of substances. The Specification clearly supports this language as the Specification clearly names at least one such substance.

Applicants respectfully request that the Examiner remove his rejection of Claims 8, 9, 12 (if the Examiner intended to reject Claim 12 here), 13 and 14 under 35 U.S.C. 112, second paragraph, as being indefinite.

Continuing in the Office Action, the Examiner rejected claims 1, 4, 17, 18 and 13 under 35 U.S.C. 103(a) as being unpatentable over the Vendik et al. paper (hereinafter referred to as “Vendik”) in view of Dimos et al. (U.S. Patent 6,096,127; hereinafter referred to as “Dimos”). According to the Examiner, as previously described, Vendik discloses in Section 6 and at FIG. 14 thereof a tunable finline phase shifter mounted within a waveguide. According to the Examiner, the tunable finline phase shifter comprises a substrate having a voltage adjustable thin film ferroelectric (e.g., BSTO) layer disposed thereon and further includes first and second conductive layers disposed on the ferroelectric layer and which are separate by a gap there between. The Examiner pointed out that the Vendik finline phase shifter differs from the claimed invention in that the gap dimension therein is not specified (i.e., between 2 and 50 microns).

According to the Examiner, Dimos discloses (FIG. 9; Dimos) a tunable ferroelectric varactor configuration including a substrate with a ferroelectric layer (e.g., BSTO, etc.) disposed thereon and with two conductive layers disposed over the ferroelectric layer and having there between a gap of 11 to 16 microns (referring to Dimos; Col. 8, line 55). Further, as stated by the Examiner, as described in Dimos; Col. 1, lines 60 – 65, objectives of the inventive structure include a high degree of tunability and low insertion loss. The Examiner referred further to Dimos; Col. 3, lines 22 – 36, to support the premise that the ferroelectric materials used in Dimos are characterized as having surprising and unexpected properties (e.g., when used at room temperature operation).

The Examiner opined that it would have been obvious in view of the references, taken as a whole to have modified the gap spacing in the fin line phase shifter of Vendik to have been 11 to 16 microns which would have been in the 2 to 50 micron range claimed, as explicitly taught by Dimos. According to the Examiner, such a modification would have been considered an obvious optimization of such gap spacing given that the general conditions (i.e., both references pertain to like structurally configured devices capable of providing at room temperature low insertion loss and excellent tunability) have been met by the prior art would have only required ordinary skill in the art, thereby suggesting the obviousness of such a modification. Moreover, according to the Examiner, the tunable varactor of Dimos (FIG. 9; Dimos) corresponds in structure to a tunable ferroelectric slot line configuration as described in Vendik (Section 2.4; Vendik). According to the Examiner,

since Vendik explicitly discloses that such a tunable slot line forms the basis for a fin line structure (Section 6, FIG. 14; Vendik); obviously the ferroelectric varactor of DIMOS would have been compatible with the tunable fin line phase shifter of Vendik. Further, according to the Examiner, with respect to Claim 17, as an obvious consequence of the combination set forth above, the resultant ferroelectric's layer will have a dielectric constant of at least 2000, as described by Dimos (Col. 3, line 30; Dimos).

Applicants have cancelled Claims 1, 4, 17 and 18.

Applicants respectfully traverse the Examiner's rejection of Claim 13 under U.S.C. 103(a) as being unpatentable over Vendik in view of Dimos. Neither Vendik nor Dimos nor any combination of Vendik and Dimos anticipates discloses, teaches, shows, suggests, infers or in any way renders obvious the present invention as claimed in Claim 13. Neither Vendik nor Dimos discloses using composite materials for the tunable dielectric layer that enables low insertion loss and phase tuning at room temperature and is comprised of at least one substance selected from the group of:

barium strontium titanate, barium calcium titanate, lead zirconium titanate,
lead lanthanum zirconium titanate, lead titanate, barium calcium
zirconium titanate, sodium nitrate, KNbO_3 , LiNbO_3 , LiTaO_3 , PbNb_2O_6 ,
 PbTa_2O_6 , $\text{KSr}(\text{NbO}_3)$, $\text{NaBa}_2(\text{NbO}_3)_5$, KH_2PO_4 . [Claim 13]

Each of Vendik and Dimos discusses dielectric layers in terms of relatively large crystals of individual materials (for example, see Dimos, Col. 4, line 17; Vendik, Section 3.3 and Section 3.5) or in terms of a solid solution of BTSO (for example, see Vendik; Section 3.2). None of the art of record discloses or teaches using a composite material comprising at least one substance from the list enumerated in Claim 13 for a tunable dielectric layer in a waveguide-finline tunable phase shifter.

Applicants respectfully request that the Examiner remove his rejection of Claim 13 under 35 U.S.C. 103(a) as being unpatentable over Vendik in view of Dimos.

The Examiner continued in the Office Action, rejecting Claims 5, 10 and 11 under 35 U.S.C. 103(a) as being unpatentable over the preceding rejection as applied to Claim 1, and further in view of Bates (EP Patent 0050393; hereinafter referred to as “Bates”). The Examiner stated that the above rejection of Claim 1 meets the claimed invention in Claims 5, 10 and 11 except for the second conductor being an RF ground (Claim 5), the first conductor being insulated from the waveguide while the second conductor is electrically connected to the waveguide (Claim 10) and an impedance matching section in the gap (Claim 11).

According to the Examiner, Bates discloses a fin line structure comprising first and second electrodes (4, 5; Bates) having a gap (3; Bates) therein which includes tapered wend sections for impedance matching purposes. The Examiner pointed out as evident from FIG 2 (Bates) the electrode (5; Bates) is in direct electrical contact with the waveguide housing by insulating layer (8; Bates) to provide low frequency isolation.

The Examiner concluded that it would have been obvious in view of the references, taken as a whole, to have further modified the conductive electrodes of the combination to have included the tapered sections (for impedance matching purposes) the isolated electrode (for low frequency isolation) and the direct connection of the electrode to the waveguide (for RF ground), as taught by Bates. According to the Examiner, such modifications would have been obvious in view of the advantages set forth above.

Applicants have cancelled Claims 5, 10 and 11.

Continuing in the Office Action, the Examiner rejected Claim 14 under 35 U.S.C. 103(a) as being unpatentable over the above rejection as applied to Claim 1 and further in view of Sengupta et al. '697 (U.S. Patent 5,766,697; hereinafter referred to as "Sengupta").

According to the Examiner, Sengupta discloses BSTO-MgO as an exemplary tunable dielectric material. The Examiner concluded it would have been obvious in view of the references taken as a whole to have further modified the BSTO ferroelectric layer in the

combination to have been a BSTO-MgO material such as taught by Sengupta. The Examiner opined that such a modification would have been considered an obvious substitution of art recognized BSTO ferroelectric material, which would not have affected the basic function of such material in the tunable phase shift device of the combination, thereby suggestion the obviousness of such a modification.

None of the art individually or in any combination with each other anticipates discloses, teaches, shows, suggests, infers or in any way renders obvious using a composite material for a tunable dielectric layer in a waveguide-finline tunable phase shifter as claimed in Claim 14.

It is respectfully submitted that Claim 14 patentably distinguishes over the art of record.

Applicants respectfully request that the Examiner remove his rejection of Claim 14 under 35 U.S.C. 103(a) as being unpatentable over Vendik in view of Dimos, and further in view of Sengupta.

The Examiner objected to Claims 2, 6, 7, 12 15 and 16. No other statement was made by the Examiner relating to Claims 2, 6, 7, 12, 15 and 16 to give detail as to the basis for the Examiner's objection. In a phone conversation with the Examiner on January 18, 2005, the Examiner advised Applicants' attorney that the objection means that Claims 2, 6, 7, 12,

15 and 16 are objected to as being dependent claims premised upon a rejected base claim but would be allowed if re-written in independent form or if the limitations of an allowable claim were incorporated within the independent base claim from which the claims depend or if re-written premised upon dependence from an otherwise allowable base claim.

Claims 2, 6, 7, 12 and 16 have been re-written in independent form.

Claim 15 was an independent claim when objected to by the Examiner in the Office Action. For this reason some confusion arises as to the meaning of the Examiner's objection. Solely in the interest of facilitating prosecution of the present Application, Claim 15 has been amended and is believed to be patentable over the art of record.

None of the art of record individually or in any combination anticipates discloses, teaches, shows, suggests, infers or in any way renders obvious using a composite material for a tunable dielectric layer in a waveguide-finline tunable phase shifter as claimed in Claim 15. It is respectfully submitted that Claim 15 patentably distinguishes over the art of record.

Applicants respectfully request that the Examiner remove his rejection of Claims 2, 6, 7, 12, 15 and 16.

Applicants respectfully request an extension of the period for response to the Office Action for one month until February 13, 2005, and the required fee under 35 U.S.C. 1.17(a)(1) is enclosed with this response.

Since Applicants have fully and completely responded to the Official Action, this Application is now in order for early action and such early action is respectfully requested. If the Examiner would deem a telephone conference to be of value in expediting this Application, he is invited to call the undersigned attorney at (972) 758-1955 at his convenience.

Respectfully submitted,



Donald D. Mondul

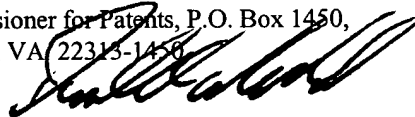
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